PRE-COURSE WORK ASSIGNMENT

COURSE:	Fire Program Management, M-581
LESSON:	D - Aviation Management
UNIT:	4 - Program Implementation
SUGGESTED TIME:	2 hours
EQUIPMENT:	None
MATERIALS:	Pre-course Work Assignment and “Risk Assessment” article
OBJECTIVES:	Upon completion of the pre-course work, participants will be able to apply a Risk Management process to an aviation related situation based on your experience and knowledge.

Pre-Course Work – 4D
Due to NAFRI by April 6, 2005

Name: _____
Email:_____
Work phone: _____

I. ACTIVITY 1

Questions

A. INTRODUCTION

The answers to the questions will be used in assessing your ability to meet the pre-course work assignment objective.

B. ASSIGNMENT

Answer the following questions.

What is your current position? (check one):

UNIT FIRE PROG. MGR. ☐ ASST. UFPM ☐ FUELS SPEC. ☐ FIRE OPS. SPEC. ☐

ENGINE CAPT. ☐ OTHER ☐
Please List _____

1. List NIIMS aviation qualifications you hold or have held:

2. Brief description of your training and experience with aviation operations:

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II. ACTIVITY 2

Exercise

A. INTRODUCTION

This exercise is not a test of your aviation experience. This exercise is a gauge of your ability to apply a Risk Management process to an aviation related situation based on your experience and knowledge. The instructor for this unit will review your responses to the Risk Management Exercise prior to the classroom training and then discuss the exercise with trainees during the unit presentation.

B. ASSIGNMENT

1. Fill out the preceding Trainee Information Sheet.

2. Read the article, "Risk Management", found at the end of this document.

3. Complete the Risk Management Exercise that follows using these instructions.
   - Review the sample Risk Management worksheet and Risk Management Definitions.
   - Read the Scenario provided.
   - Complete the Risk Assessment Worksheets based on information contained in the "Risk Management" article and the Scenario.
     - Identify the Mission,
     - Identify the hazards,
     - Assess the mission,
     - Develop Controls and Make a Risk Decision,
     - Implement the Controls,
     - Supervise and Evaluate.

   - Develop specific controls for each hazard. Make a Risk Decision based on the controls and mitigation for each hazard.

   - Describe how you would implement the controls.

   - Answer the series of questions relating to the Scenario and Risk Management principles. All questions should be answered and all worksheets should be completed, regardless of your level of aviation expertise.

4. Submit the Trainee Information Sheet and the entire Risk Management Exercise (including your worksheets) along with other required M-581 course pre-work. Retain the "Risk Management" article and bring it with you to the M-581 course

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Name: _____
Email:_____
Work phone: _____

Date / /	M-581 AVIATION MANAGEMENT
MISSION Be specific	**!!EXAMPLE!!- Aerial Observer Flight**
IDENTIFY HAZARDS Consider all aspects of current & future situations, environmental & known historical problem areas. Human, Machine, Medium, Mission	1.Operating out of uncontrolled airport. 2.Severe weather (wind, down drafts, lightning, etc.) 3.Limited Visibility (smoke) 4.High Density Altitude @ airport 5.Loss of Communication 6.Aviation Mishap
ASSESS HAZARDS Determine the risks. Assess the impact of each hazard in terms of probability & effect[1]	1.Frequent, critical 2.Seldom, Moderate 3.Seldom, Moderate 4.Frequent, Critical 5.Seldom, Moderate 6.Unlikely, Critical
DEVELOP CONTROLS & MAKE RISK DECISION Develop control measures that eliminate the hazard or reduce the risk. As control measures are developed, risks are re-evaluated until all risks are reduced to a level where benefits outweigh potential cost.	1.Use sterile cockpit procedures 1.Use of uncontrolled airport procedures 2.Flight weather planning 3.Do not operate in limited visibility areas 3.Schedule flights when inversions lift 4.Capable aircraft 4.Weight & balance planning 4.Schedule flights for cooler hrs. of day 5.Check all radios prior to departure 5.Back up of Automated Flight Following 5.Observer carries Handheld and/or cell 6.Following FAA and Agency policy
IMPLEMENT CONTROLS Put controls in place to eliminate the hazards or reduce the risk.	1.During contract pre-work discuss Unit and agency policy 1.Flight Mgr./Chief of Party training for agency employees 2.Observer monitors wx and discusses with pilot 2.Est. unit Go/No Go weather parameters 3.Follow FAA and agency policy for minimum visibility 4.Follow Aircraft contract and agency policy 5.If AFF equipped follow policy 5.Ensure radio checks 5.Unit fixed wing flight PPE stds. 6.Unit Aviation Mishap Response Plan 6.Training for aviation mishap 6.Coordination with local area emergency response agencies
SUPERVISE & EVALUATE Enforce standards & controls. Evaluate the effectiveness of controls and adjust/update as necessary. Review process as necessary.	
NOTES Document review of hazards & controls, successes and problems.	

[1] **PROBABLILITY** described as: Frequent, Likely, Occasional, Seldom or Unlikely. **EFFECT** described as: Catastrophic, Critical, Moderate or Negligible.

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RISK MANAGEMENT: DEFINITION OF TERMS

HAZARD: Any real or potential condition that can cause injury, illness, or death of personnel, or damage to or loss of equipment or property.

RISK: Chance of hazard or bad consequence; exposure to chance of injury or loss. Risk level is expressed in terms of hazard probability and severity.

EXPOSURE: The frequency and length of time subjected to a hazard.

PROBABILITY: The likelihood that an event will occur.

SEVERITY: The expected consequence of an event in terms of degree of injury, property damage, or other mission-impairing factors that could occur.

CONTROLS: Actions taken to eliminate hazards or reduce their risk.

RISK ASSESSMENT: The identification and assessment of hazards (first two steps of risk management process).

RESIDUAL RISK: The level of risk remaining after controls have been identified and selected for hazards that may result in loss. Controls are identified and selected until residual risk is at an acceptable level or until it cannot be practically reduced any further.

RISK DECISION: The decision to accept or not accept the risk(s) associated with an action; made by the commander, manager, or individual responsible for performing that action.

SCENARIO A:

You are unit fire program manager on the Bigfork Unit. At 0100 today a lightning storm passed over your unit and started numerous fires. The fire with the most potential (High Value FMU) is in a remote area that is extremely steep terrain with fuel types ranging from pinyon-juniper to subalpine fir. Ground transport to the fire area is approximately one hour over rough, single-lane, roads.

It is 0500 and you are planning the initial attack response to the fire with the highest potential. The unit's aerial detection aircraft is beginning its detection flight of the lightning area at 0600. You assigned one 5-person initial attack module to drive to the area and begin walking in to the fire. They will coordinate with the detection aircraft and get coordinates to the fire of concern.

At 0700, the detection aircraft spots the fire and relays size-up information (2 acres in PJ transitioning to sub-alpine fir, lots of potential, no break in fuels) to dispatch. The initial attack module copied the information and begins to walk from the vehicles.

At 0730, the Unit rappel helicopter shows up over the fire and requests a fire status from dispatch. They have 4 helitack on board and can rappel all four onto the fire. The center manager asks if you want the rappellers.

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At 0830, the IA module arrives on the fire. The fire has grown to almost 5 acres by the time the IA module arrives.

SCENARIO B:

By 0900, your unit has staffed 4 fires, but the lightning map shows almost 100 strikes and only trace precipitation is reported by the unit's RAWS.
You need to get out there and see this for yourself, so you go to the airport intending to fly as an observer on the Unit air attack platform as it goes out to air attack the fires.

Complete the Risk Management worksheet for both scenarios below.

Date / /	M-581 EXERCISE AIR OPERATIONS	
MISSION Be specific	**SCENARIO A**	**SCENARIO B**
IDENTIFY HAZARDS Consider all aspects of current & future situations, environmental & known historical problem areas. Human, Machine, Medium, Mission		
ASSESS HAZARDS Determine the risks. Assess the impact of each hazard in terms of probability & effect[1]		
DEVELOP CONTROLS & MAKE RISK DECISION Develop control measures that eliminate the hazard or reduce the risk. As control measures are developed, risks are re-evaluated until all risks are reduced to a level where benefits outweigh potential cost.		
IMPLEMENT CONTROLS Put controls in place to eliminate the hazards or reduce the risk.		
SUPERVISE & EVALUATE Enforce standards & controls. Evaluate the effectiveness of controls and adjust/update as necessary. Review process as necessary.		

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NOTES Document review of hazards & controls, successes and problems.		

EXERCISE QUESTIONS:

1. What is your overall **subjective** risk assessment (considering all the hazards without applying mitigating controls) of each scenario?

   Scenario A- Extremely High _____ High _____ Moderate _____ Low _____

   Scenario B- Extremely High _____ High _____ Moderate _____ Low _____

2. After mitigating the hazards and implementing controls, what is your overall **adjusted** risk assessment for scenarios?

   Scenario A- Extremely High _____ High _____ Moderate _____ Low _____

   Scenario B- Extremely High _____ High _____ Moderate _____ Low _____

3. After developing controls and implementing controls, what is your Risk Decision? How would you respond:
   a. Initial Attack

   b. Aircraft flight

4. In these situations, what category would you classify your risk assessment process?

Scenario A	Scenario B	
_____	_____	Rapid Risk Assessment (example- collision avoidance while driving a car)
_____	_____	Deliberate Risk Assessment (example- making a decision to get closer to the edge of a cliff—for a better view)
_____	_____	In-Depth Risk Assessment (example- planning, briefing and documentation done prior to implementing a helicopter aerial ignition)

   Why?

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5. At what level of leadership within your unit, should these particular risk decisions be made? (Example: You, your assistant, the unit line officer, the Unit Fire Program Manager, etc.)

   Justify your answer.

FIRE PROGRAM MANAGEMENT, M-581
4D – AVIATION MANAGEMENT
Pre-course Article

RISK MANAGEMENT [1]

Risk Management Theory

Risk management is a tool that helps leaders make sound decisions in a logical manner. Used in a positive command climate, risk management can become a mindset that governs all unit missions and activities. Risk management enables leaders at all levels to do exactly what the term implies: manage risks. The term is best applied generically, as leaders are confronted with a variety of risks: training risks, fiscal risks, and safety risks. Safety risk management, however, is a specific type of risk management. This article is directed toward safety risk management and how it fits into the leader's tool bag.

Risk *assessment* is just one part of the risk management process. It involves identifying the hazards and assessing the relative risk associated with those hazards. However, just identifying the hazards and evaluating the risk is not enough. Risk *management* is necessary to implement controls, make decisions and monitor performance so that risks are eliminated or mitigated to an acceptable level.

Before commanders can effectively use risk management as an accident prevention tool, they must remember to:

- Accept that *some* risk is inherent in carrying out any action
- Integrate risk management into the planning process
- Accept no unnecessary risk
- Make risk decisions at the proper level
- Accept the risk only if benefits outweigh the cost

Risk management is a five-step cyclic procedure that is easily integrated into the decision-making process. It is cyclic in that a decision can be made to not conduct a task because the level of risk is un-acceptable; after cycling through the process and implementing more controls, a new decision can be made. This decision-making process is ingrained into [incident] team leaders and readily lends itself to safety risk management.

STEP 1: Identify The Hazards
STEP 2: Assessing The Hazards/Risk
STEP 3: Make a Risk Decision
STEP 4: Implement Controls
STEP 5: Supervise/Monitor/Evaluate

[1] This material is excerpted from various articles on risk management contained in *"Flightfax", Report of Army Aircraft Accidents (December, 1991, Volume 20, No. 2; February, 1994; November, 1993; March, 1994, Volume 22, No. 6; April, 1994, Volume 22, No.7).*

STEP 1: IDENTIFY THE HAZARDS

Hazards are the potential sources of danger that could be encountered while performing a task or mission. In order to eventually eliminate or reduce risk, hazards must be described in their most tangible form. Instead of just: "there are power lines in the project area..." we can get more specific information that "high tension, multi-strand wires suspended from 200 foot metal towers crossing the river at Sinkers Ferry". "Poor visibility tomorrow" may be better defined as "visibility less than 1/4 mile in valley bottoms due to smoke, inversion to break by 1300 hrs".

There may be multiple hazards, some presenting more risk than others. The process of identifying and researching one hazard may lead to the identification of others. Leaders should seek to identify all known hazards before continuing on to the next step.

STEP 2: ASSESS THE HAZARDS/RISK

All identified hazards must be assessed to determine their cumulative risk effect on the mission or objective. Each hazard is analyzed to determine the ***severity*** of problems it may cause and the ***probability*** of it happening. Subjectivity is inherent in assessing risk; each person will do it differently. The **Risk Assessment Matrix (next page)** is useful in assigning a relative risk value to known hazards.

Assessing Cumulative Risk. The cumulative risk of all hazards must be determined. You may encounter several hazards that have all been individually assessed as low-moderate risk; however, the cumulative risk of all these combined may be assessed as med-high. The assessment of cumulative risk may be subjective or additional worksheets may be developed to arrive at over-all risk values. However, if not properly used, the risk assessment can become a risk in itself if it establishes numerical values ***too low*** for the hazards identified. Conversely, the assignment of probability and effect values that are ***too high*** may result in an over-cautious approach that ignores risk mitigation measures that could be implemented. To ensure the validity of the risk values, leaders should determine that they yield a risk level commensurate with the complexity of the mission. First assess the risks both individually and cumulatively ***without mitigation measures***, and then repeat the process ***with mitigation measures*** in place. After considering mitigating controls, the hazards may (or may not) be assessed at a lower level.

In addition, the assessment of hazards should include ***identifying risks associated with not performing the intended mission.*** If a mission is cancelled, how will that affect other functions of the organization? If alternative methods are proposed to meet the objective, risk management techniques should then be applied to those methods.

RISK ASSESSMENT MATRIX			HAZARD PROBABILITY				
			Frequent	Likely	Occasional	Seldom	Unlikely
			A	B	C	D	E
EFFECT	Catastrophic	I	EXTREMELY HIGH		HIGH		MEDIUM
	Critical	II		HIGH		MEDIUM	
	Moderate	III	HIGH	MEDIUM			
	Negligible	IV	MEDIUM	LOW			

EFFECT: Severity of the possible outcome. If the hazard is encountered during a flight mission or other operation, the effect may be:

Catastrophic: Death or serious injury; total system/equipment loss

Critical: Serious injury; substantial damage to equipment

Moderate: Mission can be accomplished, though there may be adverse effects on mission efficiency (extra cost, delays, etc.)

Negligible: No effect on mission accomplishment.

PROBABILITY: The probability of encountering the hazard during the flight mission or other operation may be:

Frequent: Continuously/often encountered during each mission.

Likely: Encountered several times during the course of many missions.

Occasional: Encountered sporadically during the course of many missions.

Seldom: Encountered infrequently, but chances are remote.

Unlikely: Encountered only rarely, chances are possible, but improbable.

STEP 3: MAKE A RISK DECISION

Leaders are expected to weigh the costs and risks against the benefits of performing an operation (however, all too often, the mentality is "mission-first"). Decisions are most obvious if the hard questions are asked first: Will the benefits to be gained from doing the mission outweigh the potential risks? Is there another, safer or more efficient, way to accomplish the objective?

Utilizing the initial risk assessment, a decision can sometimes be made. If one or more of the individual hazards is rated as a high or extremely high risk, or if the cumulative risk is high or extremely high, some leaders may decide to scrap the mission; no-go is always an alternative. However, after mitigating controls are included (Step 4), a second risk assessment can be performed. It may be that enough of the hazards will be reduced or eliminated so that the over-all risk is then acceptable.

Appropriate Levels For Making Risk Decisions. Risk decisions should be made at a level of command that corresponds to the degree of risk and complexity. Too often, the decision is made at too low a level of command. This can occur by design (that is, the decision is assigned to lower levels whenever low or medium risk is assessed) or it occurs when lower-level personnel make high-risk decisions independently. The effect is that the risk decision is not elevated to higher level commanders when their experience and command influence in lowering risks are most needed.

Commanders should train subordinate leaders to recognize hazardous situations and to elevate decision-making to the appropriate command level. Getting the chain-of-command involved in the *entire* risk management process enhances the chances of accomplishing the mission safely; in addition, all levels of command are informed and have a stake in the outcome.

In some situations, all functions of an organization may be affected by a risk decision made in one functional group. Because other functions and possibly large numbers of people may be affected, the other functional leaders should be an integral part of the risk management process. This is clearly a case where the decision should be made at the highest level. ***Although risk assessment and management is a team effort, final risk decisions must be made by <u>one</u> individual, regardless of level.***

AIR OPERATIONS LEVELS OF DECISION-MAKING

Extremely High Risk	**IC**
High Risk	**OSC**
Medium Risk	**AOBD**
Low Risk	**ASGS/HEBM**

STEP 4: IMPLEMENT CONTROLS

This step is tied closely with Steps 1-3 in a cyclic process. As hazards are identified and assessed, controls are proposed to mitigate or eliminate the risk, ***regardless of the risk level***. Even low risks should be mitigated whenever possible. When controls have been planned or implemented, an adjusted risk assessment should be performed using Steps 1 through 3. The purpose of this re-assessment is to ensure that the mission still falls within acceptable limits, or that identified hazards/risks have been mitigated to an acceptable level.

Each control measure must address and mitigate specific hazards. Some hazards may be physically eliminated such as removing trees, cables or other objects that pose a threat. Other hazards may be eliminated by *timing* such as conducting a mission when known hazards (i.e., other aircraft) will not be in the area. A very common mitigating control is the issuance of aerial hazard maps to pilots and aircrews. In some cases, a short safety briefing may be the only measure required. In other instances, a comprehensive special safety plan or SOP may have to be developed and implemented. Higher complexity controls are required for higher complexity risks. This may mean a comprehensive change in personnel training and qualification requirements or even changes in policy or procedures.

In every mission scenario, the leader must provide the crew with a mission briefing on the specifics of mitigating controls and operating procedures. A brief-back is then required to ensure that all is understood. Controls should be in place to ensure that personnel have a clear understanding of when the situation requires re-assessment during mission execution. Many times that may mean aborting the mission until situations change or conditions improve.

Policy, regulations and standard operating procedures are all institutionalized safety controls where risk management has been pre-exercised through experience (mostly bad experience). But risk management is a continual process, ingrained in planning, that should be applied to all operations, especially those that are unique, complex or high-risk.

STEP 5: SUPERVISE/EVALUATE

The last step in managing risk is to supervise operations to ensure that mitigation measures are being implemented. Direct supervision of crews and missions may be delegated; however, the risk decision-maker must also be involved in monitoring operations and performance. This includes follow up during and after an action to see if all went according to plan, re-evaluating the plan or making adjustments as required to accommodate unforeseen issues or situations, and incorporating lessons learned for future use.

RISK MANAGEMENT IN TIME & SPACE

Performing risk assessments and making decisions in the field is limited by the amount of time available for planning and requires flexibility and judgment by leaders. Such risk assessments can be divided into three major categories:

Rapid Risk Assessment. This method is required when planning time is minimal. For example, aviators encounter hazards while in flight frequently and must manage the situation immediately. Training and experience aid the pilot in assessing the threat and making a decision in seconds or minutes. Consciously or subconsciously, they are quickly applying the principles of risk management. In this compressed form of risk management, the mitigating controls are in the form of previous training and experience, standard checklists, recommended emergency procedures and the availability and use of assistance (other crewmembers, other aviators, air traffic controllers, dispatchers, etc.). Time will be the factor influencing the quality of risk management. Even a rapid risk assessment is better than just reacting.

Deliberate Risk Assessment. This method is used when planning time permits; it may take a few hours or a few days. All risk management should be deliberate, if time allows. It involves systematic identification of hazards, risk assessment, evaluating control options, and re-assessment and risk decision-making. Again, the time spent going through the process should be commensurate with the level of risk and complexity of the situation, given the time allowed.

In-Depth Risk Assessment. A thorough risk assessment should be used when risks appear high and time and resources allow it. Risk management at this level requires more sophisticated techniques, extensive research and professional reviews; it may take months or years to complete. An in-depth risk assessment is necessary when an aviation unit is to utilize a new type of aircraft or initiate a new program (for example: heli-rappel program).